

Title: Design and Development of a Regenerative Blower for Space Suit Ventilation

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The ventilation subsystem in future space suits will require a dedicated ventilation fan. The unique requirements for the ventilation fan, including stringent safety requirements and the ability to increase output to operate in buddy mode, combine to make a regenerative blower an attractive technology choice. This paper describes progress in the design, development, and testing of a regenerative blower designed to meet requirements for a ventilation subsystem for future space suit life support. Analysis methods were developed for the blower's complex internal flows and impeller geometries were identified that enable significant improvements in blower efficiency. Performance predictions were verified by test, measuring aerodynamic efficiencies of 45% at operating conditions that correspond to the ventilation fan's design point. A compact motor/controller was developed to drive the blower efficiently at low rotating speed (4500 rpm). Finally, a low-pressure oxygen test loop was assembled to demonstrate the blower's reliability under prototypical conditions.